Author's Copy Educational Purposes Only

Public Health (1997) 111, 321–325
© The Society of Public Health, 1997

GP fundholding and prescribing in UK general practice: evidence from two rural, English Family Health Services Authorities

DL Baines, P Brigham, DR Phillips, KH Tolley and DK Whynes

Department of Economics, University of Nottingham, University Park, Nottingham, NG7 2RD, UK

Background: Two separate prescribing budget regimes (part of GP fundholding and the indicative prescribing scheme) were introduced into UK general practice in April 1991 in an attempt to contain the growth in NHS expenditure on prescribed drugs.
Objectives: The aims of this study are (i) to examine whether the fundholding scheme has been more effective at containing prescribing cost growth than the indicative prescribing scheme and (ii) to ascertain whether its implementation, at a practice level, has been affected by local circumstances and conditions.
Methods: Prescribing cost data were collected from two rural, English Family Health Services Authorities for the financial years 1990/1991 to 1993/1994. Exploratory analysis was performed using regression analysis and non-parametric statistical techniques.
Results and conclusions: Initially, the fundholding scheme has been the more effective at containing expenditure on prescribed drugs. However, the implementation of the schemes in rural areas has probably been affected by the existence of practices with permission to dispense drugs to their own patients, due to a lack of pharmacies in such areas.

Keywords: fundholding; dispensing; prescribing costs; general practice; rurality

Introduction

Between 1980 and 1991, National Health Service (NHS) expenditure on prescribed drugs rose, in real terms, by approximately 60%.[1] Throughout this period, prescribing cost inflation was a source of concern for the UK government. A number of measures were taken to effect spending control, including the introduction of the limited-list and the promotion of generic substitution.[2,3] Although these measures were designed to reduce the cost of each item prescribed, they did not limit annual expenditure on drugs. In a cash-limited NHS, prescribing cost inflation was possible because prescribing in general practice (which accounts for 80% of NHS spending on drugs) was not capped.

In order to improve financial control, two separate budgetary regimes were introduced into general practice in April 1991, as part of a package of NHS reforms.[4] Under the fundholding scheme, practices may elect to hold their own, cash-limited budgets for the purchase of some hospital and community services, the salaries of non-medical staff and prescribing of drugs.[5] Such practices are given a management allowance (to cover the costs of operating the scheme) and may generate budget surpluses (which may be spent on improving practice services). Practices that fail to manage their budgets appropriately are exited from the scheme, with the loss of the benefits that membership confers. Non-fundholding practices, on the other hand, are assigned Indicative Prescribing Amounts (IPAs), which are notional budgets that practices are expected to keep their annual prescribing expenditure within.[6] In principle, the effectiveness of IPAs depends upon voluntary compliance, although certain incentives and a system of monitoring and sanctions accompany the scheme.[7,8]

Correspondence: Dr DK Whynes
Accepted 26 February 1997

Even though IPAs were designed to be as effective as fundholding budgets, evidence suggests that prescribing cost inflation has been relatively lower in fundholding practices.[9–13] To date, however, most studies have been based on a small sample of practices, usually located within one Family Health Services Authority (FHSA). The aims of this paper are (i) to examine whether the fundholding scheme has been more effective at containing prescribing cost growth than IPAs and (ii) to ascertain whether its implementation, at a practice level, has been affected by local circumstances and conditions. To overcome the biases that may have been present in previous studies, the effect of the fundholding scheme on prescribing in two similar English FHSAs, namely Lincolnshire and Devon, is examined.

Lincolnshire is a rural county of East England, whilst Devon is a county of the South-West, which contains the uplands of Exmoor and Dartmoor. Table One presents basic socio-demographic data for the two counties, principally derived from the 1991 Census.[14] Although Devon has nearly twice as many residents, both have population densities lower than the average for England and Wales (3.2 people per hectare). The other demographic data presented suggest that an analysis of the effect of fundholding on prescribing costs in the two counties is unlikely to be influenced by confounding factors, such as differences in age structure, unemployment, ethnicity or morbidity. Despite the similarities in demography, expenditure on drugs dispensed per patient was 15.86% higher in Lincolnshire than Devon during the financial year 1993/1994.[15]

Methods

Data were collected for practices in Lincolnshire and Devon for the period 1990/1991 (the year before the introduction of fundholding) to fiscal year 1993/1994 (up to and including the third wave of recruitment into the

Table 1 Comparative data for Lincolnshire and Devon, 1991

	Lincolnshire	Devon
Area (hectares)	584 800	671 100
Population	584 534	1 009 950
Population density (people per hectare)	1.0	1.5
Proportion of population of pensionable age (%)	21.1	23.2
Unemployment (%):		
Male	8.3	8.7
Female	4.0	4.2
Proportion of population with limiting long-term illness (%)	24.4	24.4
Proportion of population which is non-white (%)	0.8	0.7
Prescribing costs (NIC) per capita (£, fiscal 1993–1994)	91.3	78.8

Source: OPCS (1992) and PPA (1995).
NIC = Net Ingredients Cost.

scheme). For the purposes of analysis, practices were classified as either fundholding or non-fundholding based upon their status during fiscal year 1993/1994. The sample of practices was divided into four cohorts: Lincolnshire fundholders ($n = 19$); Devon fundholders ($n = 22$); Lincolnshire non-fundholders ($n = 86$); Devon non-fundholders ($n = 106$). Prescribing costs were measured as Net Ingredient Cost (NIC) per patient, that is, expenditure by the NHS on drugs prescribed, excluding dispensing fees and any discounts offered.

Exploratory statistical analysis was performed in order to ascertain whether any differences in prescribing expenditures (or patient and practice characteristics) existed between the fundholding and non-fundholding cohorts in these two counties. Normality testing of the variables (using Lillifors' modification of the Kolmogorov–Smirnov one-sample test) revealed significant departures from the normal distribution in many cases. Accordingly, the non-parametric Kruskal–Wallis one-way analysis of variance method was employed to test for significant differences.[16] The method of multiple comparisons was used to assess significance for all pairs in the four cohorts. All results reported as significant are so at the 0.05 level or below. Multiple regression was also performed (using NIC per patient as the dependent variable with patient, practice and prescribing characteristics as explanatory variables) in order to identify the determinants of prescribing costs as the practice level.

Results

Table 2 displays the practice and patient characteristics of fundholding and non-fundholding practices in Lincolnshire and Devon. According to multiple comparisons undertaken, non-fundholding practices in Lincolnshire were, on average, significantly smaller than practices in the other three cohorts (in terms of total number of partners and patients). Fundholding practices in Lincolnshire were, on average, significantly larger than those in Devon. Non-fundholding practices in Devon were, at the mean, significantly smaller than fundholding practices in both areas. In both counties, fundholding practices were, on average, larger than non-fundholding practices, although this is to be expected given the scheme's minimum list-size criterion of at least 7000 patients.[17] No differences in the average number of patients per general practitioner (GP), the proportion of patients aged 65 y and over, the percentage of patients registered as unemployed, or in the proportion by which temporary residents inflated practice list-size, were evident between any of the cohorts. Devon non-fundholders did, however, provide more night visits per 1000 patients that Lincolnshire non-fundholding practices.

No difference in the proportion of dispending practices between the Lincolnshire fundholding and non-fundholding cohorts, or between Devon fundholders and non-fundholders, was found. A higher proportion of practices in Lincolnshire had dispensing status than in the Devon cohorts. Dispensing practices are permitted to dispense their own prescriptions to patients living a mile from a pharmacy, as a means of compensating for the lack of pharmacies in rural areas.[18] Although both counties had similar population densities, Lincolnshire had proportionally more dispensing practices because its rural areas are relatively more populated than Devon's moorlands. The proportion of dispensing practices in a cohort may influence prescribing costs, as it has been hypothesised

Table 2 Practice and patient characteristics of Lincolnshire and Devon fundholding and non-fundholding practices, 1993/1994

	Lincolnshire		Devon		Significant differences between groups
	fundholders (1)	non-fundholders (2)	fundholders (3)	non-fundholders (4)	
Total GPs	5.47	2.51	4.27	3.31	2d1; 2d3; 2d4; 3d1; 4d1; 4d3
Total patients	10 688.63	4612.84	8748.27	5867.21	2d1; 2d3; 2d4; 3d1; 4d1; 4d3
Patients per GP	1961.42	1899.70	1987.73	1830.51	No differences
Proportion of patients ≥ 65 y (%)	18.09	19.46	19.85	19.97	No differences
Unemployment rate (%)	7.53	8.24	7.61	8.56	No differences
Temporary resident list-inflation (%)	8.81	6.38	9.95	7.65	No differences
Night visits per 1000 patients per year	34.54	34.74	34.89	42.62	2d4
Proportion of dispending practices (%) (1 = yes, 0 = no)	42.11	60.47	18.18	16.04	1d3; 1d4; 2d3; 2d4

Table 3 Net ingredients costs (prescription) per patient in Lincolnshire and Devon fundholding and non-fundholding practices, 1990/1991 to 1993/1994

	Lincolnshire		Devon		Significant differences between groups
	fundholders (1)	non-fundholders (2)	fundholders (3)	non-fundholders (4)	
NIC per patient, 1990/1991	48.09	57.46	45.92	50.00	2d1; 2d3; 2d4
NIC per patient, 1991/1992	54.98	66.72	51.54	57.86	2d1; 2d3; 2d4; 4d3
NIC per patient, 1992/1993	60.64	74.10	55.75	65.12	2d1; 2d3; 2d4; 4d3
NIC per patient, 1993/1994	63.02	83.02	59.82	72.10	2d1; 2d3; 2d4; 4d1; 4d3
Percentage change in NIC per patient, 1990/1991 to 1993/1994	32.03	47.35	32.52	44.96	2d1; 2d3; 4d1; 4d3

that the fee given each time an item is dispensed encourages practices to prescribe more drugs.[19]

Table 3 shows the average prescribing expenditure per patient in each cohort over the financial years 1990/1991 to 1993/1994. During fiscal 1990/1991 non-fundholding practices in Lincolnshire spent, on average, significantly more on prescribing per patient than practices in the other three cohorts. As a result, non-fundholding practices in Lincolnshire had a higher average NIC per capita than the country's fundholding cohort. However, there was no difference in average prescribing expenditures between the fundholding and non-fundholding cohorts in Devon. During the financial years 1991/1992 and 1993/1994 the significant differences in average NIC per patient between Lincolnshire non-fundholders and all other cohorts remained. Once the fundholding scheme became operational in April 1991, average prescribing expenditure per patient in the Devon fundholding cohort became significantly less than in the county's non-fundholding group. For the first time, during 1993/1994 Devon fundholders prescribed significantly more items generically than the non-fundholding cohort in the county.

The differential rates of generic prescribing in each cohort (Table 4) may be explained by the effects of dispensing status and the fundholding scheme on prescribing behaviour. A previous study suggests that dispensing practices prescribed fewer medicines generically, probably due to current product liability regulations and the greater margins that may be derived from proprietary drugs.[20] Indeed, the differences in the rates of generic prescribing between the four cohorts in this study reflect the proportion of dispensing practices in each of the groups. The fundholding scheme, on the other hand, seems to have increased generic prescribing rates in the practices that attained such status. During the period 1990/1991 to 1993/1994, both fundholding cohorts had a significantly higher increase in their generic prescribing rates than Devon non-fundholders. However, this growth rate was not significantly different from that achieved by Lincolnshire non-fundholding practices, probably because this cohort started with the lowest rate of generic prescribing. Not only would this have made it relatively easier to prescribe more medicines generically, but, with a lower denominator, every generic item added to the numerator would have produced a larger proportionate change in the generic prescribing growth rate. Nevertheless, by 1993/1994 Lincolnshire non-fundholding practices still had a lower rate of generic prescribing than those achieved by the other three cohorts in 1990/1991.

Table 5 presents the results of a regression of practice, patient and prescribing variables on NIC per patient, using data for the 1993/1994 financial year. The table reports a full model, in which a 'forced entry' of all variables was undertaken. In the full model, the constant gives the average NIC per patient for the Devon non-fundholding cohort. The percentage of patients age 65 y and over, temporary resident list-inflation, night visits and generic prescribing were significant variables, all with coefficients of the expected size and sign.[21] Unemployment and patients per GP were found to have no significant influence on NIC per patient. Lincolnshire non-fundholding practices had a significantly higher average NIC per patient than the Devon non-fundholding cohort, whilst fundholding practices in both counties had significantly lower levels of expenditure. Table 5 also reports a reduced model, which only includes the variables found to be significant in the full model.

Discussion

Multiple regression analysis indicated that during the financial year 1993/1994 elderly patients, night visits and temporary residents increased average NIC per patient amongst the practices sampled. Unemployment and the number of patients per GP were found to have no

Table 4 Items prescribed generically in Lincolnshire and Devon fundholding and non-fundholding practices, 1990/1991 to 1993/1994

	Lincolnshire		Devon		Significant differences between groups
	fundholders (1)	non-fundholders (2)	fundholders (3)	non-fundholders (4)	
Percentage generics, 1990/1991	37.44	31.63	45.93	43.05	2d1; 3d1; 3d2; 4d1; 4d2
Percentage generics, 1991/1992	38.11	32.71	47.24	43.57	2d1; 3d1; 3d2; 4d2
Percentage generics, 1992/1993	39.73	33.62	49.11	44.28	2d1; 3d1; 3d2; 4d2
Percentage generics, 1993/1994	44.48	35.30	53.84	46.88	2d1; 3d1; 3d2; 3d4; 4d2
Percentage change in generics, 1990/1991 to 1993/1994	19.87	13.31	19.64	9.49	4d1; 4d3

Table 5 Regression on net ingredients cost (prescription) per patient, 1993/1994

Variables	Full model		Reduced model	
	β	*t*-ratio	β	*t*-ratio
Percentage of list aged 65 y or above	0.99	5.44	0.96	5.27
Percentage list inflation due to temporary residents	0.21	2.31	0.24	2.78
Night visits per thousand patients	0.10	2.54	0.12	2.91
Unemployment	0.49	1.53		
Patients per GP	0.00	0.86		
Percentage of items prescribed generically	−0.35	−4.59	−0.31	−4.24
Lincolnshire non-fundholders (1 = yes, 0 = no)	8.66	4.08	9.24	4.40
Lincolnshire non-fundholders (1 = yes, 0 = no)	−7.14	−2.13	−7.36	−2.20
Devon fundholders (1 = yes, 0 = no)	−9.44	−2.92	−9.68	−3.06
Constant	56.20	9.56	60.57	11.71
Adjusted R-squared		0.40		0.39

significant effect on costs at this level, whilst increased generic prescribing was found to reduce expenditure. The signs and significances of these variables are as hypothesised and in keeping with the results of previous studies.[22,23] The dummy variables and the constant, on the other hand, suggest that the differences in prescribing costs between cohorts are independent of the other variables included in the model. For example, generic prescribing may be used by all practices, regardless of cohort membership, to reduce average costs. Statistical analysis did not, however, suggest that the characteristics of patients registered with fundholding practices gave them a comparative advantage at controlling prescribing expenditures.

During the year prior to introduction of the fundholding scheme, practices in Lincolnshire that were to remain non-fundholders during its first three waves had a significantly higher NIC per patient than those that joined the scheme. However, at this time, no difference was evident in average prescribing costs between Lincolnshire and Devon fundholding practices. These results suggest that in Lincolnshire: (i) only lower cost practices applied to join the fundholding scheme, (ii) that fundholding status was only granted to lower cost practices, or (iii) a combination of both. In other words, some degree of selection-bias and/or screening may have operated during this period.[24]

Between 1990/1991 and 1993/1994, both fundholding cohorts had a significantly lower prescribing cost growth rate than each of the non-fundholding groups. As a result, the cost differential between the Lincolnshire cohorts grew from 19.54 to 31.75%, and NIC per patient in Devon non-fundholding practices became significantly higher than in the two fundholding groups. These results support the findings of previous studies[9–13] and suggest that, initially, the fundholding scheme was more effective than IPAs at containing prescribing cost inflation. Exploratory statistical analysis also supports the finding that fundholding practices increase their generic prescribing rates, as a means of controlling expenditure on drugs.[10–12,25]

Given their high rate of generic prescribing, fundholding practices may experience difficulties in creating further savings from this source. In consequence, whether the differences in costs and cost inflation between the cohorts are sustained will, in part, depend upon the ability of fundholding practices to find further means of controlling prescribing expenditures.[26] Indeed, recent evidence suggests that, in the longer-term, the rate of prescribing cost growth in fundholding practices will increase, as their ability to generate further savings diminishes.[27–29]

Despite evidence to suggest that fundholders have been more effective at containing costs, little is known about the factors that influence prescribing behaviour in such practices. In principle, the fundholding scheme embodies a set of incentives and constraints designed to contain practice expenditure within the budget set. For example, surpluses may be spent on service provision, whilst inappropriate budget management leads to expulsion from the scheme. Exploratory statistical analysis also suggests that organisational characteristics affect a practice's response to the fundholding scheme. For example, the fundholding practices sampled here were significantly larger (in terms of patient and partner numbers) than non-fundholding practices, which may have influenced their ability to control prescribing costs.

The implementation of the fundholding scheme may also have been affected by the incidence of dispensing practices within Lincolnshire and Devon. As well as being paid a dispensing fee, such practices earn a margin on each drug prescribed and may profit from discounts offered by the manufacturers of proprietary medicines. In other words, the dispensing practice scheme embodies a number of disincentives to prescribing cheaper, generic drugs. Given that fundholders prescribe more items generically, dispensing practices with fundholding status may have to trade-off income from dispensing with the benefits that membership of the fundholding scheme brings. Moreover, the limits on spending imposed by prescribing budgets are, in effect, a cap on income derivable from dispensing. In sum, dispensing status is likely to discourage some practices from joining the fundholding scheme and probably influences the prescribing behaviour of the dispensing practices that attain fundholding status.

The differences in costs between fundholding and non-fundholding practices may also have resulted from differences in the strategic behaviour of non-fundholding practices. For example, practices planning to become fundholders may artificially inflate their prescribing costs prior to entry to the scheme, as a means of obtaining a larger budget allocation. As a result, such practices will have a greater ability to derive larger budget surpluses once they are in the scheme. Despite its plausibility, little evidence has been found to support this hypothesis.[30] Alternatively, potential fundholders may resist prescribing cost savings in order to guarantee budget surpluses once they have joined the scheme. The fundholding scheme may, therefore, embody a perverse incentive, which encourages non-fundholding practices to delay potential savings into

the future. If so, such behaviour could, in part, explain the lower rate of generic prescribing in the non-fundholding cohorts sampled here.

Conclusions

The following conclusions may be drawn from this study. Firstly, the fundholding scheme has been more effective than IPAs at containing prescribing cost inflation amongst the practices sampled. Secondly, at a local level, the implementation of the fundholding scheme has probably been affected by the type of practices situated within individual FHSAs. Despite these findings, the limitations of this study must be stated. As only prescribing costs were measured, it is not been possible to evaluate whether lower cost prescribing in fundholding practices is rational prescribing, or whether prescribing cost control has affected patient welfare.[31] Moreover, as urban FHSAs are likely to face different conditions, the results of this paper may only be applicable to rural areas. Finally, although to date the fundholding scheme has achieved some success in containing NHS expenditure on drugs, its ability to do so in the longer term has yet to be proven.

References

1 Office of Health Economics. *Compendium of Health Statistics*. OHE: London, 1995.
2 Association of British Pharmaceutical Industry. *Limiting Medicines—Reducing Choice*. ABPI Briefing. ABPI: London, 1992.
3 Feely MP. Generic prescribing. In Harris C. (ed). *Prescribing in General Practice*. Radcliffe Medical Press: Oxford, 1996.
4 Department of Health. *Working for Patients*. HMSO: London, 1989.
5 Department of Health. *Working for Patients (working paper 3): practice budgets for general medical practitioners*. HMSO: London, 1989.
6 Department of Health. *Working for Patients (working paper 4): indicative prescribing budgets for general medical practitioners*. HMSO: London, 1989.
7 National Health Service Management Executive. *Prescribing Incentive Schemes Regulations*. EL(95)20, DoE: London, 1994.
8 Cresswell J. Excessive prescribing: what are the sanctions? *Prescriber* 1993; **January:** 17–18.
9 Wilson RPH, Bucham I, Walley T. Alterations in prescribing by general practitioner fundholders: an observational study. *Br Med J* 1995; **311**: 1347–1350.
10 Bradlow J, Coulter A. Effect of fundholding and indicative prescribing schemes of general practitioners' prescribing costs. *Br Med J* 1993; **317**: 1186–1189.
11 Dowell JS, Snadden D, Dunbar JA. Changes to generic formulary: how one fundholding practice reduced prescribing costs. *Br Med J* 1995; **310**: 505–508.
12 Maxwell M, Heaney D, Howie JGR, Noble S. General practice fundholding: observations on prescribing patterns and costs using the Defined Daily Dose method. *Br Med J* 1993; **307**: 1190–1194.
13 Comptroller and Auditor General. *General Practitioner Fundholding in England*. HMSO: London, 1994.
14 Office of Population Censuses and Surveys. *1991 Census*. OPCS: London, 1992.
15 Prescription Pricing Authority. *Annual Report*. Prescription Pricing Authority: Newcastle, 1996.
16 Altman DG. *Practical Statistics for Medical Research*. Chapman and Hall: London, 1991.
17 Audit Commission. *Briefing on GP Fundholding*. HMSO: London, 1995.
18 Morton-Jones T, Pringle M. Dispensing by physicians and pharmacists: a UK perspective. *PharmacoEconomics* 1994; **5** (1): 5–7.
19 Ryan M, Bond C. Dispensing physicians and prescribing pharmacists: economic considerations for the UK. *PharmacoEconomics* 1994; **5**: 8–17.
20 Morton-Jones TJ, Pringle MAL. Prescribing costs in dispensing practices. *Br Med J* 1993; **306**: 1244–1246.
21 Whynes DK, Baines DL, Tolley KH. *Prescribing Costs in General Practice: The Impact of Hard Budget Constraints*. Departmental Discussion Paper No. 96/10. University of Nottingham Department of Economics: Nottingham, 1996.
22 Roberts S, Harris CM. Age, sex and temporary resident originated prescribing units (ASTRO-PUs): new weightings for analysing prescribing of general practices in England. *Br Med J* 1993; **307**: 485–488.
23 Whynes DK, Baines DL, Tolley KH. Explaining variations in General Practice prescribing costs per ASTRO-PU. *Br Med J* 1996; **312**: 488–489.
24 Baines DL, Whynes DK. Selection bias in GP fundholding. *Health Econ* 1996; **5**: 129–140.
25 Glennerster H, Matsaganis M, Owens P, Hancock S. *Implementing GP Fundholding: Wild Card or Winning Hand?* Open University Press: Buckingham, 1994.
26 Audit Commission. *A prescription for Improvement: Towards More Rational Prescribing in General Practice*. HMSO: London, 1994.
27 Wilson R, Walley T. Prescribing costs in general practice fundholding. *Lancet* 1995; **346**: 1710–1711.
28 Stewart-Brown S *et al*. The effects of fundholding in general practices on prescribing habits three years after the introduction of the scheme. *Br Med J* 1995; **311**: 1543–1547.
29 Audit Commission. *What the Doctor Ordered: A Study of GP Fundholders in England and Wales*. HMSO: London, 1996.
30 Healey AT, Reid JP. Do prospective fundholders inflate their prescribing costs? A study of Grampian fundholding and non-fundholding practices. *Health Bull* 1994; **54** (4): 282–284.
31 Association of the British Pharmaceutical Industry. *Cheap Prescribing: Can We Afford it*? ABPI: London, 1994.